Dear Students,

Puzzle Investigator problems (PIs) present you with an opportunity to investigate complex, interesting problems. Their purpose is to focus on the process of solving complex problems. ***You will be evaluated on your ability to show, explain, and justify your work and thoughts.*** *Save all of your work, including what does not work, in order to write about the processes you used to reach your answer.*

Completion of a Puzzle Investigator problem includes four parts:

- **Problem Statement:** State the problem clearly in your own words so that anyone reading your paper will understand the problem you intend to solve.
- **Process and Solutions:** Describe in detail your thinking and reasoning as you work from start to finish. Explain your solution and how you know it is correct. Add diagrams when it helps your explanation. Include what you do that does not work and changes you make along the way. If you do not complete this problem, describe what you *do* know and where and why you are stuck.
- **Reflection:** Reflect about your learning and your reaction to the problem. What mathematics did you learn from it? What did you learn about your math problem solving strategies? Is this problem similar to any other problems you have done before? If yes, how?
- **Attached work:** Include *all* your work and notes. Your scratch work is important because it is a record of your thinking. Do not throw anything away.

PI-01. LONG DISTANCE

The odometer (which measures the distance traveled) on Mario's parents' car reads 28,882 when his father fills it up. Since Mario's family is going on vacation, his father set the trip odometer to 0 so he will know how many miles long the trip is. To keep Mario and his sister busy during the trip, he gives them the following problems.

a. Mario noticed that there are only 2 different digits in the number 28,882. How far will the car need to travel before all the digits are different? What is that number?

b. The numbers 101, 1221, and 1357531, among many others, are all **palindromes** because their digits read the same left-to-right as they do right-to-left. When are the next five times that the digits of the car odometer will be a palindrome?

c. When is the next time that both the car odometer and the trip odometer will be a palindrome?